There does not seem much doubt that the outbreaks reviewed in this discussion and the outbreak at the Royal Free Hospital constitute a clinical entity in which encephalomyelitis is the most serious feature. The name recently suggested for the entity is benign myalgic encephalomyelitis (*Lancet*, 1956). This title has certain merits and certain disadvantages; the use of the adjective "benign," although it correctly implies that there is no loss of life, gives a misleading impression of the severity and possible permanency of the neurological manifestations of the disease. The use of the adjective "myalgic" is a valuable reminder of this important and common feature of the illness. The title as a whole, however, fails to indicate that there is involvement of lympho-reticular structures.

Summary

An epidemic illness which affected nearly 300 members of the staff of the Royal Free Hospital Group between July 13 and November 24, 1955, is reported.

The clinical picture is studied in 200 in-patients. There is evidence of involvement of lympho-reticular structures in almost every case and of involvement of the central nervous system in about three-quarters of the 200.

The illness tends to run a fluctuating course. Treatment was symptomatic, but in 20 cases antibiotics were tried without effect. No patient died of the disease.

In the majority of cases recovery is the rule. Severe disability, however, may persist for many months and has persisted in at least four patients who are still disabled at the time of this report.

Laboratory investigations give no aid to diagnosis; haematological changes are non-specific and the cerebrospinal fluid is normal.

Electrodiagnostic investigations failed to show any evidence of lower motor neurone degeneration except in one case. The motor paralysis was accompanied by a reduction in the number of motor-unit potentials recruited on attempted volition, the residual potentials often being polyphasic. Occasionally, particularly during recovery, volition was accompanied by grouping of the motor-unit potentials.

Epidemiological studies suggest that the disease is spread by case-to-case contact and that the incubation period is five to six days.

Extensive investigations with the help of outside laboratories have failed, so far, to reveal either an infective agent or a causative factor.

The relationship of the outbreak in the Royal Free Hospital Group to similar epidemics reported in recent years from almost every quarter of the globe is discussed.

We received help from many sources, and we would like to record our gratitude to the staffs of the Public Health Departments of the Boroughs of St. Pancras and of Islington, the Virus Reference Laboratory, the London School of Hygiene, the M.R.C. Group for Research on Virus Diseases the Ministry of Health, the National Hospitals for Nervous Diseases, the Middlesex Hospital, the Hospital for Sick Children, the Radcliffe Infirmary, Oxford, the Whitley Hospital, Coventry, the Addington Hospital, Durban, the Eastman Dental Hospital, to the late Sir Lionel Whitby, C.V.O., *M.C.*, and to the nursing, auxiliary administrative, and ancillary staff of the R.F.H. Group. The Royal Free Hospital medical staff would also like to put on record the constant service of our Senior Medical Registrar, Dr. P. E. Jackson, in co-ordinating this report.

Figs. 1 and 2 are included by courtesy of the Editor of the *Journal of Hygiene*.

References

Acheson, E. D. (1954). *Lancet*, 2, 1044.
Alexander, J Struan (1956). *S. Afr. med. J.*, **30**, 88.
Bauwens, P. (1955). *Proc. roy. Soc. Med.*, **48**, 194.
Bradshaw, J. P. P. (1954). *Brain*, 77, 138.
Campbell, A. M. G., and Garland, H. (1956). *J. Neurol. Psychiat.*, **19**, 268.
Crowley, N., Nelson, M., and Stovin, S. (1957). *J. Hyg., Camb.*, **55**, 102.
Economo, C. von (1931). *Encephalitis Lethargica*, trans. by K. O. Newman. Oxford Univ. Press, London.
Kmet, J., Vesenjak-Zmijanac, J., Bedjanič, M., and Rus, S. (1955). *Bull. Wld Hlth Org.*, **12**, 491.
Lancet (1956). **1**, 789.
Leibowitz, S. (1953). *Infectious Mononucleosis*, p. 69. Grune and Stratton, New York.
Macrae, A. D., and Galpine, J. F. (1954). *Lancet*, **2**, 350.
Nathan, P. W., and Smith, M. C. (1955). *Brain*, **78**, 248.
Pellew, R. A. A. (1951). *Med. J. Aust.*, **1**, 944.
Pond, W. L., and Russ, S. B. (1955). *Bull. Wld Hlth Org.*, **12**, 591.
Ramsay, A. M., and O'Sullivan, E. (1956). *Lancet*, **1**, 761.
Richardson, A. T. (1956). *Ann. Phys. Med.*, **3**, 81.
Sigurdsson, B., Sigurjónsson, J., Sigurdsson, J. H., Thorkelsson, J., and Gudmundsson, K. R. (1950). *Amer. J. Hyg.*, **52**, 222.
Sumner, D. W. (1956). *Lancet*, **1**, 764.
Walshe, F. M. R. (1919). *Brain*, **42**, 1.
—— (1920). Ibid., **43**, 196.
—— (1942). Ibid., **65**, 409.
White, D. N., and Burtch, R. B. (1954). *Neurology*, **4**, 506.

AN OUTBREAK OF ACUTE INFECTIVE ENCEPHALOMYELITIS IN A RESIDENTIAL HOME FOR NURSES IN 1956

BY

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The outbreak of encephalomyelitis in the Royal Free Hospital Group began on July 13 and ended on November 24, 1955. During this time approximately 300 persons contracted the disease. This included 8 out of the 40 nurses and staff of the Royal Free Hospital Nurses' Preliminary Training School, N.W.8. The cases here all occurred from the end of July to the beginning of August, 1955.

In order that the report of the epidemic may be complete we record a further small outbreak associated with the Preliminary Training School which started in May, 1956. At this time there were resident 27 students, 3 teaching staff, one warden, and 7 domestic staff, a total population at risk of 38.

The number of notifications from the Preliminary Training School was seven, divided as follows: Student nurses, 5; sister, 1; member of domestic staff, 1. The dates of onset were: May 16, one student nurse; May 20, one student nurse; May 27, one student nurse; May 30, one student nurse; May 31, one sister; June 1, one student nurse; June 6, one maid.

The following is a summary of the illness in these seven patients, including the dates when they were admitted to the Sick Bay of the Royal Free Hospital and transferred or admitted direct to the Lawn Road Fever Hospital.

Case 1

Student nurse aged 18. Onset of illness, May 16; admitted to sick bay May 17; admitted to Lawn Road Hospital on June 1.

Symptoms.—Right earache, general malaise, severe headache, retrosternal pain, dizziness, nausea, and occasional

vomiting. These subsided, but they recurred on May 28 together with a low-grade pyrexia.

Signs on June 1.—A few palpable tender posterior cervical glands, but no other abnormal signs except slow cerebration and a minimal weakness of the right biceps.

Within three days the patient developed pain in her neck and right arm, and was found to have paresis of the right arm and right leg. This persisted, together with nausea, general malaise, and headache, for the next two weeks. She then had a right facial weakness and a weakness of her left arm and leg. The condition deteriorated and she developed photophobia, blurred vision, generalized muscular pain, and abdominal guarding.

At this stage she had to be given an intravenous drip. Her condition slowly improved and by July 12 she was able to walk with help. By the end of August, although her progress was generally maintained, she was still getting short spells of dizziness. This cleared, and she was able to return to duty on September 17, and has worked full-time since then. During most of her illness she was emotionally very labile.

Case 2

Student nurse aged 18. Date of onset, May 20, 1956; admitted to sick bay May 21; admitted to Lawn Road Hospital on June 5.

Symptoms.—Headache and nausea, which passed off, but between May 25 and 28 she had a fall and knocked her head. This was followed by a slight headache and a numb feeling on the left side of her face.

Signs.—Temperature was normal throughout. The throat was slightly injected; some enlarged cervical glands were easily palpable; all tendon reflexes were very brisk.

The patient improved and lost all her symptoms, but on June 25 she developed a frontal headache and paraesthesiae of her left arm; she also felt very tired. The headache and a "creepy" sensation in the left side of her head and excessive fatigue persisted during most of July but disappeared early in August. Patient decided to give up nursing.

Case 3

Student nurse aged 28. Date of onset, May 27; admitted to sick bay May 30; transferred to Lawn Road Hospital June 5.

Symptoms.—General malaise, right earache, nausea and anorexia, dizziness.

Signs.—A few palpable tender posterior cervical glands. She was apyrexial throughout and returned to duty on July 4, and has been working full-time since then.

Case 4

Student nurse aged 19. Date of onset, May 30; admitted to sick bay May 31; transferred to Lawn Road Hospital June 5.

Symptoms.—Headache, general malaise, nausea, pain in right arm and leg.

Signs.—A few palpable cervical glands; slight pyrexia; paraesthesia right foot; tendon reflexes, rather exaggerated.

The signs and symptoms cleared within two weeks and she returned to duty on July 4 and has worked full-time since then.

Case 5

Sister at P.T. school, aged 39. Date of onset, May 31; admitted to sick bay May 31; transferred to Lawn Road Hospital June 5.

Symptoms.—Headache, general malaise, pain in left arm and leg, nausea and anorexia.

Signs.—There were no objective signs except slight diminution of right biceps reflex.

The symptoms continued for about ten days and the patient was discharged home on June 18. She returned to duty on July 4, but was off duty again for one month in October with tonsillitis and general debility. Apart from this absence, she has been well and on duty since then.

Case 6

Student nurse aged 21. Date of onset, June 1; admitted to sick bay June 1; transferred to Lawn Road Hospital June 5.

Symptoms.—Tiredness and anorexia on May 31, followed on June 1 by headache, nausea, and pain in left ear. The headache continued for about a week.

Signs.—There were no abnormal physical signs.

The patient returned to duty on July 4 and has been well and working full-time since then.

Case 7

Woman aged 20 on domestic staff. Date of onset, June 6; admitted to Lawn Road Hospital June 13.

Symptoms.—Headache and giddiness. Left-sided strabismus, but this might have been of long standing. At no time was her temperature raised. Her E.S.R. was 50 mm. in one hour, which fell to 3 mm. in five days. All her reflexes were slightly exaggerated, but had returned to normal by July 7.

She returned to duty on June 27 and has worked satisfactorily since then.

Case 8

Staff nurse of Royal Free Hospital aged 24. She was admitted to the sick bay of the Royal Free Hospital on May 1 with sinusitis. On May 17 she was in contact with Case 1 (it is stated for not more than half an hour). She was discharged on May 19 to a convalescent home. On May 29 she returned to duty at the Royal Free Hospital. On June 1 she vomited twice and developed pains in both legs, and on June 2 complained of weakness in both lower limbs. On June 3 she was readmitted to the sick bay and transferred to Lawn Road Hospital on June 5.

Signs.—June 5. A few small enlarged cervical glands and on the anterior border of the trapezius; anaesthesia of the right side of face and neck to cotton-wool and pinprick. Slight degree of paresis in both arms with complete anaesthesia to cotton-wool and pinprick. Joint and vibration sense absent in the right arm and an area of anaesthesia on the left side. There was general diminution in power in her legs, with anaesthesia to cotton-wool and pinprick and absent joint and vibration sense on the right side. The signs, together with drowsiness and nausea, persisted for about a week, when she became brighter. The anaesthesia of her arms improved slightly, that in the legs persisted. She also had bouts of vertigo and nausea and very acute paraesthesia.

By the end of June her condition had improved, but sensation was still impaired on the right side. By the middle of July she could walk unaided but with a rather spastic tremulous gait, and there was some foot-drop on the right side. She still had anaesthesia of her right and left legs and was very readily fatigued. On July 18 she was discharged for convalescence and returned to duty on October 11. She has been well, and working, since then.

Discussion

Two doctors who were in contact with some of the above eight cases were admitted to hospital. In one case the diagnosis of encephalomyelitis was doubtful, the doctor being in hospital from June 23 to July 10. In the second case the doctor went off duty on June 17 and has not yet returned, her recovery being complicated by an attack of acute appendicitis.

Leaving out the two doctors, it will be seen that, of the eight cases described, one was off duty for 2 weeks, four for 5 weeks, one for 2 months, one for 3½ months, and one for 5 months; this is probably a typical pattern of the disease.

The outbreak was of short duration and it is possible that this was due to quick administrative action following the experience in the group in the previous year. As soon as it became obvious that there was an outbreak of acute infective encephalomyelitis the Preliminary Training School was

disbanded, and all those residents who were not ill were sent home. Close contact was kept with them, and in no case did they or any of their home contacts develop illness. The ward in which Case 8 was working before contracting encephalomyelitis was closed from June 8 to 18 for the admission of all except urgent cases.

There was no spread to patients, although the probationers in training were visiting various hospitals in the group.

All the patients admitted to the sick bay of the Royal Free Hospital, Gray's Inn Road, were transferred to the infectious disease hospital of the group at Lawn Road as soon as the outbreak was diagnosed as acute infective encephalomyelitis, and succeeding cases were admitted directly to Lawn Road.

Every attempt was made to correlate this epidemic with the previous outbreaks in the various hospitals of the group, but no success was achieved. Such pathological examinations as were carried out showed the same negative results as in previous epidemics.

Some idea of the difficulties which arise during an outbreak of this description are typified by the fact that at the time of this small epidemic eight people working in or associated with the Royal Free Hospital were admitted or transferred to Lawn Road as suspected cases of acute infective encephalomyelitis which were not confirmed as such, the final diagnoses being as shown in the accompanying Table.

Patient	Final Diagnosis
A nurse from Royal Free Hospital	Headaches
,, ,, ,, ,, ,, ,,	Intercostal myalgia
A radiographer from Royal Free Hospital	Acute exudative herpetic tonsillitis
A student radiographer from Royal Free Hospital	Stress syndrome
A casualty receptionist from Royal Free Hospital	Acute respiratory catarrh
A patient in Royal Free Hospital with haemorrhage due to duodenal ulcer, and who developed ophthalmoplegia	Small cerebral thrombus
A cardiological technician at Lawn Road Hospital	Infectious mononucleosis
A clerk at the Royal Free Hospital	Renal colic and congenital malformation of kidneys

Twelve other individuals associated with the Royal Free Hospital or seen in the out-patient department were sent home as suspected mild cases of acute infective encephalomyelitis. They were followed up. They did not develop typical symptoms of this condition nor did they convey infection to other persons.

During the course of the epidemic a patient from a suburb 10 miles north-west of London presented herself at the out-patient department of the Royal Free Hospital. She was admitted to the Fever Hospital as a typical case of acute infective encephalomyelitis with stiff neck, temperature, and paresis of the muscles of the left shoulder, without loss of reflexes or muscle wasting.

The occurrence of sporadic cases unassociated with the bulk of cases in the limited sphere of the hospital epidemic was a feature of the outbreak in the previous year and, in fact, of outbreaks described in other countries.

Summary

A small outbreak of acute infective encephalomyelitis is described in a residential training school for nurses.

Of 38 individuals resident and at risk 7 developed the disease.

In 6 cases the symptoms were mild—5 recovering within five weeks and 1 within two months.

One case was complicated by serious neurological manifestations, and recovery was delayed for three and a half months.

One nurse from the hospital group concerned was in contact with this more serious case for half an hour and developed the disease. She showed marked neurological manifestations and was off duty for five months.

Two doctors contracted the disease. In one case the diagnosis was doubtful.

Eight cases of illness in contacts are described in which the diagnosis of acute infective encephalomyelitis was not confirmed.

There were no deaths.

It is possible that prompt administrative action localized and controlled the epidemic.

We would like to pay tribute to the physicians of the Royal Free Hospital Group, who have supplied us with most of the clinical information on which this report is based, and in particular to Dr. Ramsay, physician at Lawn Road Hospital. With his permission we saw all the cases ourselves repeatedly, and it was his kindness in helping us with the clinical details and progress of the patients that enabled us to make this report. We would also express our indebtedness to Sir Daniel Davies, senior physician of the Royal Free Hospital, for his ready help and advice. We would also like to thank Dr. Doreen Nutbourne, who was R.M.O. of the Royal Free Hospital at the time of the outbreak, for her daily co-operation.

UREA, THE FORGOTTEN DIURETIC

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The introduction of mercurial diuretics marked an outstanding advance in the treatment of chronic congestive heart failure. This therapy can generally be relied upon to ease the distress of oedema and other accumulations of fluid. It is nevertheless sometimes found that after a while the diuretic effect wanes, and this development marks a critical stage in treatment. Increasing the dosage of digitalis does not then improve the urinary output; while the patient, who may have been taking the drug for years, has frequently become so sensitive to it that even small amounts cause bradycardia and coupling. Other standard methods of averting fluid accumulation may fail at the same time; thus rigid sodium restriction may worsen the general condition through electrolytic imbalance and the blood urea may steadily rise. Aspiration and acupuncture may bring temporary relief but do not arrest the downhill course. Nor do the newer diuretics solve the problem, since their efficacy is generally inferior to that of mercurial diuretics. These considerations prompted us to reassess, in a systematic trial, the value of urea, the only effective diuretic of the pre-mercurial days, now fallen into disuse.

Friedrich (1892) was the first to use urea for oedema due to various causes; with doses of 3–14 g. he reported favourable results. These were confirmed by Strauss (1896, 1921), and Feilchenfeld (1919). Volhard (1918) used even larger doses (40–60 g. a day) with good success in nephrotic oedema. Crawford and McIntosh (1925) gave the first detailed account of its use in eight cases of congestive heart failure. They were able to double the urinary output with a daily dose of 45 g. Prolonged administration gave rise to anorexia, vomiting,